

# EUROPEAN PATENT OFFICE

## Patent Abstracts of Japan

PUBLICATION NUMBER : 05059664  
PUBLICATION DATE : 09-03-93

APPLICATION DATE : 02-09-91  
APPLICATION NUMBER : 03250387

APPLICANT : TOYOBO CO LTD;

INVENTOR : MINAGAWA TAKUMI;

INT.CL. : D06M 13/127 D06B 19/00 D06M 13/17 // D06M101:06

TITLE : METHOD FOR RESIN FINISHING OF FIBER PRODUCT

ABSTRACT : PURPOSE: To enable a resin finishing method of fiber product of providing the fiber product with flexibility, high wrinkle preventing ability and shrink preventing ability without lowering strength in subjecting a cellulosic fiber product to resin finishing with formaldehyde vapor by using a polyhydric alcohol having a specific boiling point.

CONSTITUTION: A cellulosic fiber-containing fiber product is immersed, for example in an aqueous solution of a polyhydric alcohol having  $\geq 150^{\circ}\text{C}$  boiling point (preferably ethylene glycol or polyethylene glycol having 90-5,000 molecular weight), uniformly dried, the cloth is exposed to formaldehyde vapor, then provided with a catalyst such as sulfur dioxide gas, heat-treated, and crosslinking bond of cellulose molecules with formaldehyde is caused and the amount of the remaining formaldehyde is suppressed to a low content to provide the cellulosic fiber-containing fiber product with excellent wrinkle preventing properties and shrink preventing properties without reducing strength.

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# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 05-059664  
(43)Date of publication of application : 09.03.1993

(51)Int.Cl.

D06M 13/127  
D06B 19/00  
D06M 13/17  
// D06M101:06

(21)Application number : 03-250387

(71)Applicant : TOYOBO CO LTD

(22)Date of filing : 02.09.1991

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### LEGAL STATUS

[Date of request for examination] 20.08.1998

[Date of sending the examiner's decision of rejection] 11.05.2000

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 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2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] About the resin treatment method which gives crease proofing property, shrink-proofing nature, and a permanent press to the textiles containing a cellulosic fiber, this invention is exposed to a formaldehyde steam in more detail, and relates to the resin treatment method by which the textiles heat-treated under existence of a catalyst have been improved.

[0002]

[Description of the Prior Art] By processing cotton or a cellulose fiber content product like cotton mix spinning with formaldehyde, and making the eternal cross linkage of a cellulose molecule start, many methods for giving eternal crease-proofing-property and shrink-proofing nature and a press are proposed. However, by these methods, since control of the cross-linkage reaction by formaldehyde was difficult, there was an inclination for repeatability to be missing. That is, when reforming was not enough, crease proofing property, shrink-proofing nature, etc. are not satisfied and reforming progressed too much, feeling became hard, and there was a case where a powerful fall became remarkable. Moreover, these methods took obstinate soaping, in order to reduce remains formaldehyde. In order to solve this problem, the moisture regain of a cellulose fiber content product is adjusted before formaldehyde processing, or a steam is introduced during processing, and there is a method which is going to control the moisture which exists in the cellulose matter in the reaction time of a formaldehyde-cellulose. Since the cross linkage by formaldehyde was carried out where cellulose fiber is swollen, although reforming with few powerful falls became possible by these methods, the exact moisture control in cellulose fiber is difficult, and there was a problem that the difference in a moisture regain influenced reforming variation, on the contrary. Moreover, repeated soaping has the problem of leading to complication of a processing process, and a cost rise, especially facilitation of soaping is desired in sewing product-like processing.

[0003]

[Problem(s) to be Solved by the Invention] this invention was performed in view of such the present condition, in the steam treatment of formaldehyde, it has few powerful falls in the appearance after crease proofing property advanced for a cellulose fiber content product, shrink-proofing nature, an eternal press, and an outstanding wash (W&W nature), gives flexible feeling, and aims at moreover stopping remains formaldehyde low.

[0004]

[Means for Solving the Problem] this invention attains the above-mentioned purpose and consists of the next composition. That is, this invention is faced exposing the textiles containing a cellulosic fiber to a formaldehyde steam, and heat-treating them under existence of a catalyst, and makes a summary the resin treatment method of the textiles characterized by the boiling point using together polyhydric alcohol of 150 degrees C or more. Hereafter, this invention is explained in detail.

[0005] The cellulosic fiber as used in the field of this invention may mean regenerated-cellulose fiber, such as natural cellulose fiber, such as cotton and hemp, rayon, and polynosic, textiles may mean cotton, thread, textiles, knitting, a nonwoven fabric, a sewing article, etc., and even if these textiles are cellulosic fiber independent, they may be mixed use products with other fiber, such as a synthetic fiber.

[0006] The boiling point is 150 degrees C or more, for example, the polyhydric alcohol used for this invention is a glycerol, ethylene glycol, a diethylene glycol, a polyethylene glycol, and polypropylene glycols, in addition is an

alkylene glycol which has an ethyleneoxy machine and a propylene oxy-basis. The polyhydric alcohol used by this invention has especially the desirable thing that has molecular weight in the range of 60-6000. Molecular weight is 90-5000 still more preferably.

[0007] since it becomes less desirable the effect of balancing it not only not being acquired but in feel even if the amount of grants of the polyhydric alcohol used for this invention is usually 0.1 - 10 % of the weight, and its effect by this invention is low at less than 0.1 % of the weight and it exceeds 10 % of the weight in this case to a processed fiber weight again, it is not desirable these polyhydric alcohol -- respectively -- independent use -- or you may use two or more sorts, combining

[0008] In this invention, if it is before exposing the processed product which the time which can apply by any methods and is given was also dyed to a formaldehyde steam, if polyhydric alcohol adheres to cellulose fiber uniformly as a method of giving polyhydric alcohol to a processed product, it is good always. Therefore, in the state of woven knitted goods, the solution of polyhydric alcohol is given by the usual pad dry method etc. so that the polyhydric alcohol of an initial complement may adhere, formaldehyde steaming is carried out as it is after that, or ground decision and after carrying out sewing, you may carry out formaldehyde steaming. Or a spray may be carried out and formaldehyde steaming may be carried out so that the polyhydric alcohol of an initial complement may adhere the solution of polyhydric alcohol to ground decision and the product which carried out sewing. Moreover, in case this polyhydric alcohol is given, you may give the softening agent for the usual textile finishing, a good sewing improver, etc. simultaneous or before it (a polysiloxane, polyethylene emulsion, etc.).

[0009] The formaldehyde steam treatment in this invention can adopt the usual method, and the catalyst to be used can also use the usual catalyst and is not restricted especially. For example, after adjusting the processed product with which initial-complement grant of the polyhydric alcohol was carried out to the moisture regain (it is 4 - 20% to the cellulose fiber weight in a product) made desirable at a formaldehyde steam treatment and exposing it to a formaldehyde steam, it is the method of giving catalysts, such as sulfurous acid gas and hydrogen chloride gas, and heat-treating at 50-160 degrees C. Moreover, the method of performing, before exposing grant of a catalyst to a formaldehyde steam may be used.

[0010] According to the resin treatment method of the textiles of this invention, after polyhydric alcohol has permeated in cellulose fiber, since the cross linkage of the cellulose molecule by formaldehyde is made to start, there can be few powerful falls, and the appearance after crease proofing property advanced for a cellulosic fiber content product, shrink-proofing nature, an eternal press, and an outstanding wash (W&W nature) can be given by flexible feeling, and remains formaldehyde can be stopped low. Moreover, in crease proofing property, the improvement effect of the crease proofing property at the time of humidity is remarkable, and achievement can attain very difficult 3.5 easily at 100% of the conventional cotton also in the appearance after wash especially.

[0011]

[Example] Hereafter, although the example explained this invention still more concretely, measurement of the various performances in an example was performed by the following method.

(b) crease-proofing-property JIS L-1096 the B method (the Monsanto method) -- conformity (\*\*) -- tearing strength JIS L-1096 the D method (the pendulum method) -- conformity (\*\*) -- bursting strength JIS L-1018 the A method (MYUREN form method) -- conformity (\*\*) -- wash appearance JIS L-1096 the A method (method using an agitated type washing machine), and line dryness -- the amount JIS of conformity (e) isolation formaldehyde L-1041 an acetylacetone method -- conformity [0012] After example 1 refinement bleaching, it was immersed in polyethylene-glycol (average molecular weight 1000) solution of 5% of solution concentration, and, subsequently the cotton broadcloth cloth of No. 40 count cotton yarn usage dyed by HakkolBRK (fluorescent dye by the Showa chemistry company) of 0.4% of solution concentration was uniformly extracted with the mangle. The contraction percentage at this time was 70%. Subsequently, it dried for 2 minutes at 105 degrees C, and gas conditioning was carried out under environment (25 degrees C, 65%RH). Then, cloth was put into the reactor and it exposed to the formaldehyde steam generated from the paraformaldehyde for 4 minutes. The temperature of a reactor while having exposed was 45 degree: C. Then, sulfurous acid gas was flowed into the reactor, cloth was exposed, after that, 150 degrees C was raised and curing of the temperature of a reactor was carried out. Subsequently, steam was flowed into the reactor and cloth was exposed for 2 minutes.

[0013] Except not carrying out being polyethylene-glycol solution immersed in the example of comparison 1 example 1, it completely processed similarly and considered as the example 1 of comparison.

[0014] It is POLON as a softening agent to polyethylene-glycol solution at example 2 example 1. Except having added MF-7 (the Shin-etsu chemistry company make) 3%, it completely processed similarly and considered as the example 2

[0015] Sumifix of after example 3 refinement bleaching and 1% of solution concentration Supra Blue It was immersed in polyalkylene glycol (30:70 (weight ratio) ethyleneoxy machine : propylene oxy-basis = molecular weight 3700 [ about ] solution of 2% of solution concentration, and, subsequently the cotton T-cloth knitting fabric of the No. 60 count cotton yarn usage who dyed by BRF (reactive dye by Sumitomo Chemical Co., Ltd.) was uniformly extracted with the mangle. The contraction percentage at this time was 95%. Subsequently, it dried for 3 minutes at 105 degrees C, and gas conditioning was carried out under environment (25 degrees C, 65%RH). Then, cloth was put into the reactor and it exposed to the formaldehyde steam generated from the paraformaldehyde for 6 minutes. The temperature of a reactor while having exposed was 55 degrees C. Then, sulfurous acid gas was flowed into the reactor, cloth was exposed, after that, 150 degrees C was raised and curing of the temperature of a reactor was carried out. Subsequently, steam was flowed into the reactor and cloth was exposed for 2 minutes.

[0016] Except not carrying out being polyalkylene glycol solution immersed in the example of comparison 2 example 3, it completely processed similarly and considered as the example 2 of comparison.

[0017] Except having added maker tex HP-600 (the Akinari chemistry company make) 0.3% as a good sewing improver in polyalkylene glycol solution in the example 4 example 3, it completely processed similarly and considered as the example 4. The measurement result of the various physical-properties values of the obtained workpiece is shown in Table 1.

[0018]

[Table 1]

		防しわ性 (W+F)°		引裂強度 (W+F) (g)	破裂強度 (kg)	洗濯後の 外 観	遊離ホルム アルデヒド 量 (ppm)
		乾	湿				
実 施 例	1	275	273	940	—	3.5	43
	2	280	280	965	—	3.5	45
	3	275	280	—	6.3	3.5	52
	4	285	280	—	6.5	3.5	50
比 較 例	1	280	250	790	—	3.0	90
	2	277	253	—	5.0	3.0	110
未加工 綿ブロード		185	170	1180	—	1.0	—
未加工 綿天竺		190	180	—	7.5	1.0	—

[0019]

[Effect of the Invention] According to the resin treatment method of this invention, there are few mechanical-strength falls, they have advanced crease proofing property, shrink-proofing nature, flexibility, and the appearance after a further excellent wash (W&W nature), and can obtain textiles with little remains formaldehyde.

[Translation done.]